

Native Fishes of North America: Status and Recovery of Southeastern Fishes

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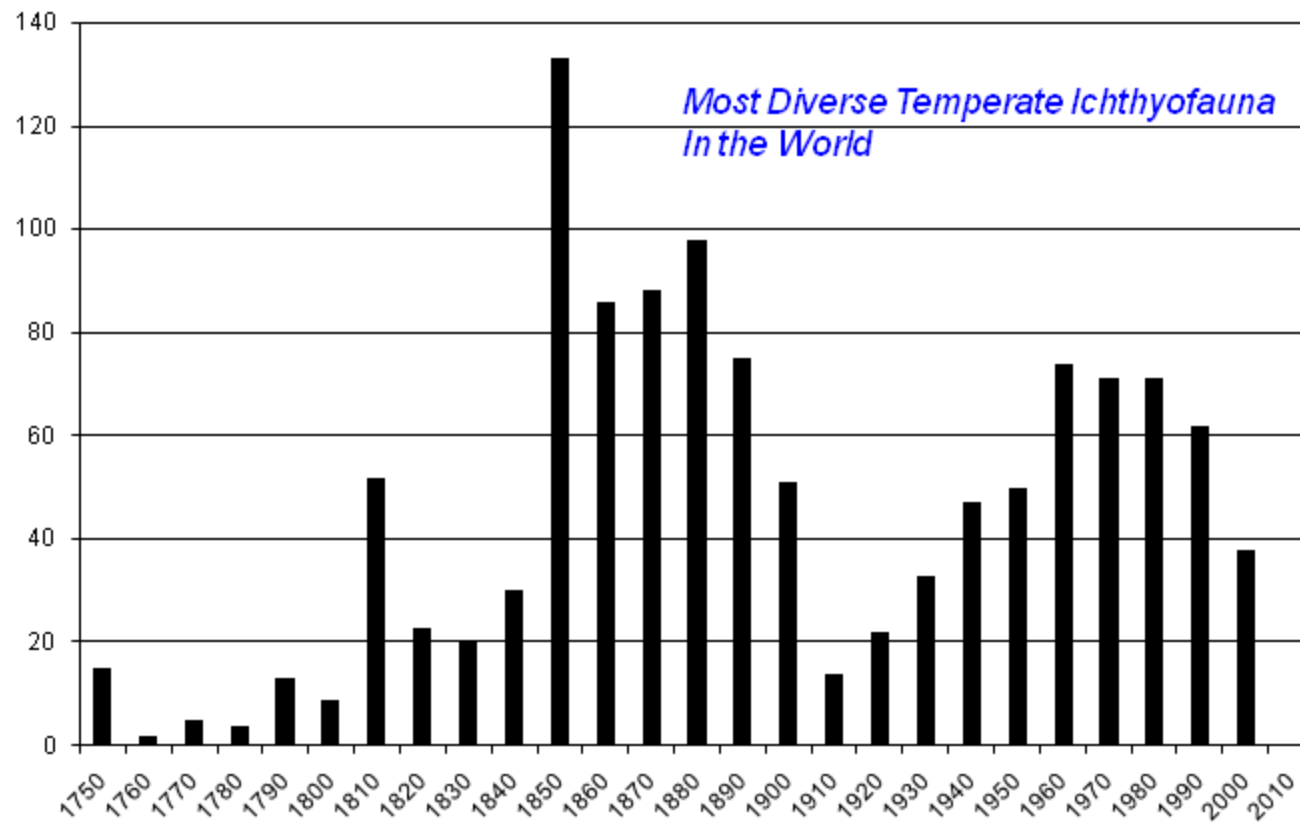
The Southeastern U.S. has the highest regional aquatic biodiversity in North America.

- The Southeast was *never* glaciated.
- Water historically abundant: many river systems *but few natural lakes*.
- Diverse *geology & physiography* creates a multitude of aquatic habitats across the region.



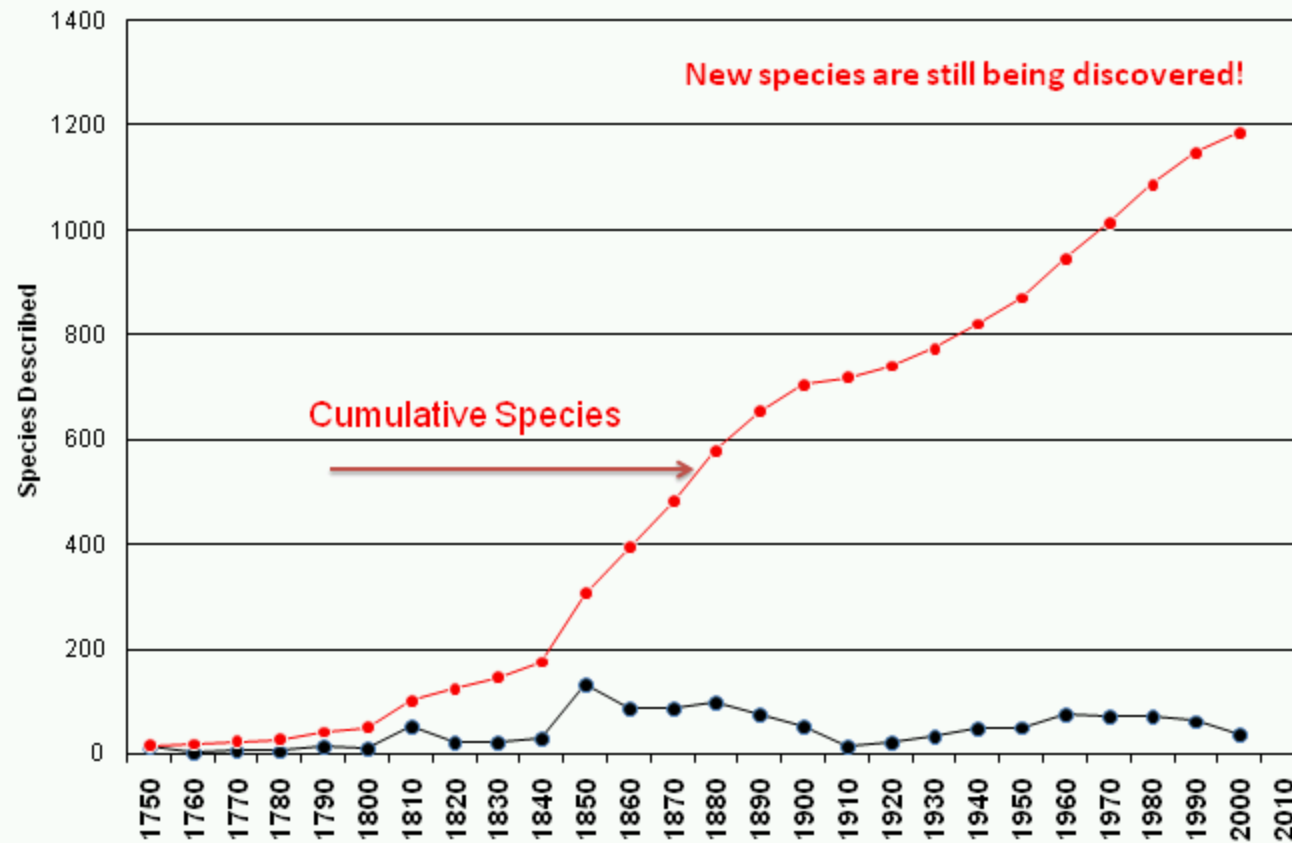
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North American Freshwater Fish Species Described as of 2008, N ≈ 1200



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Description Rates of North American Freshwater Fishes 2008 N \approx 1200

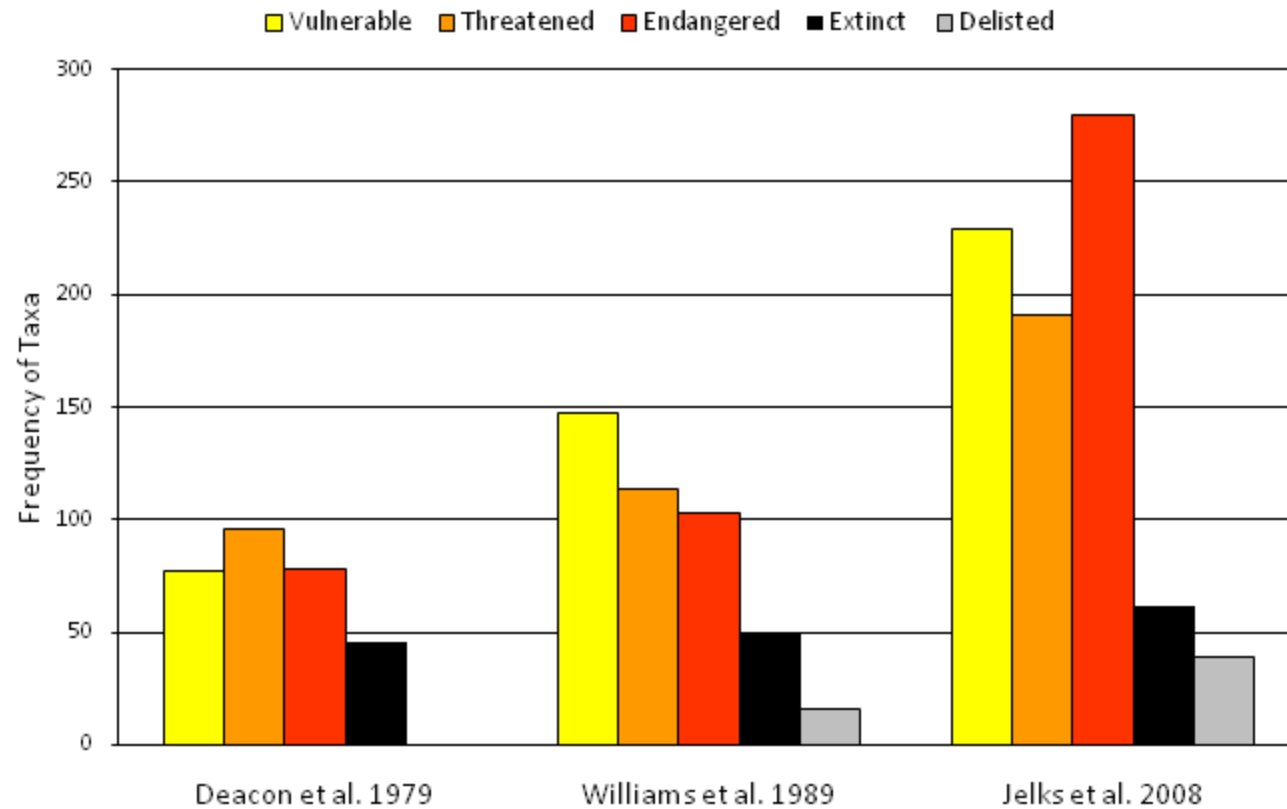


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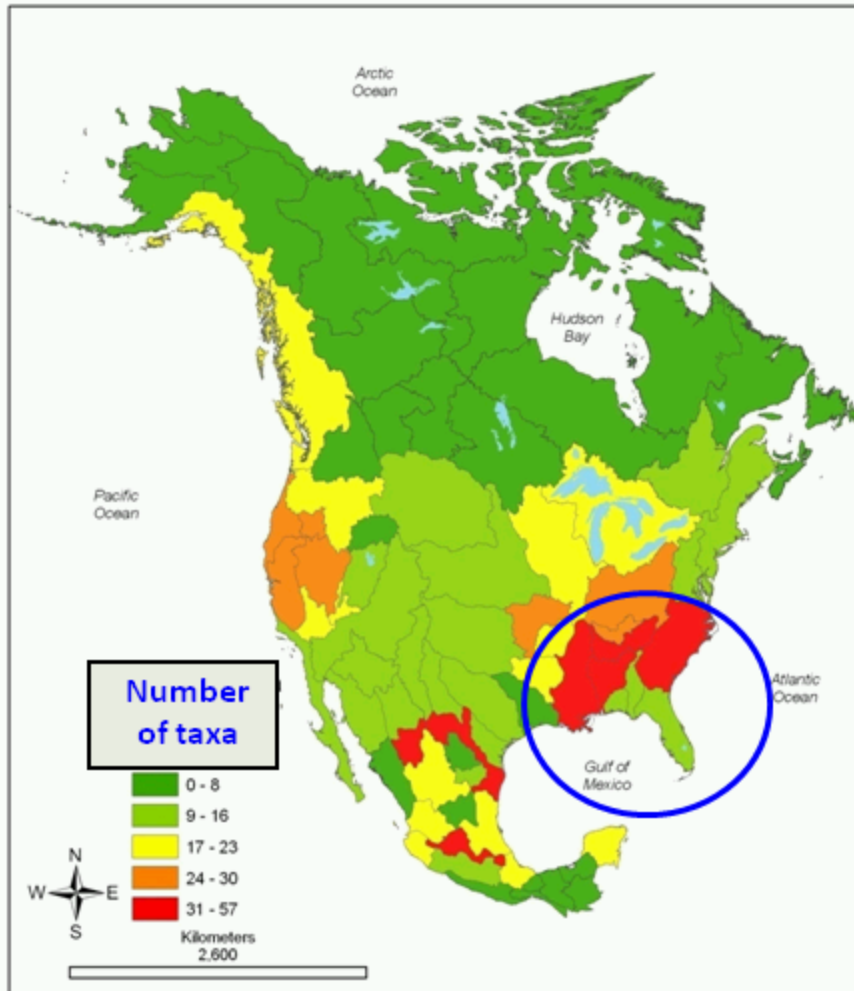
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Comparison of AFS Status Assessments North American Freshwater Fishes

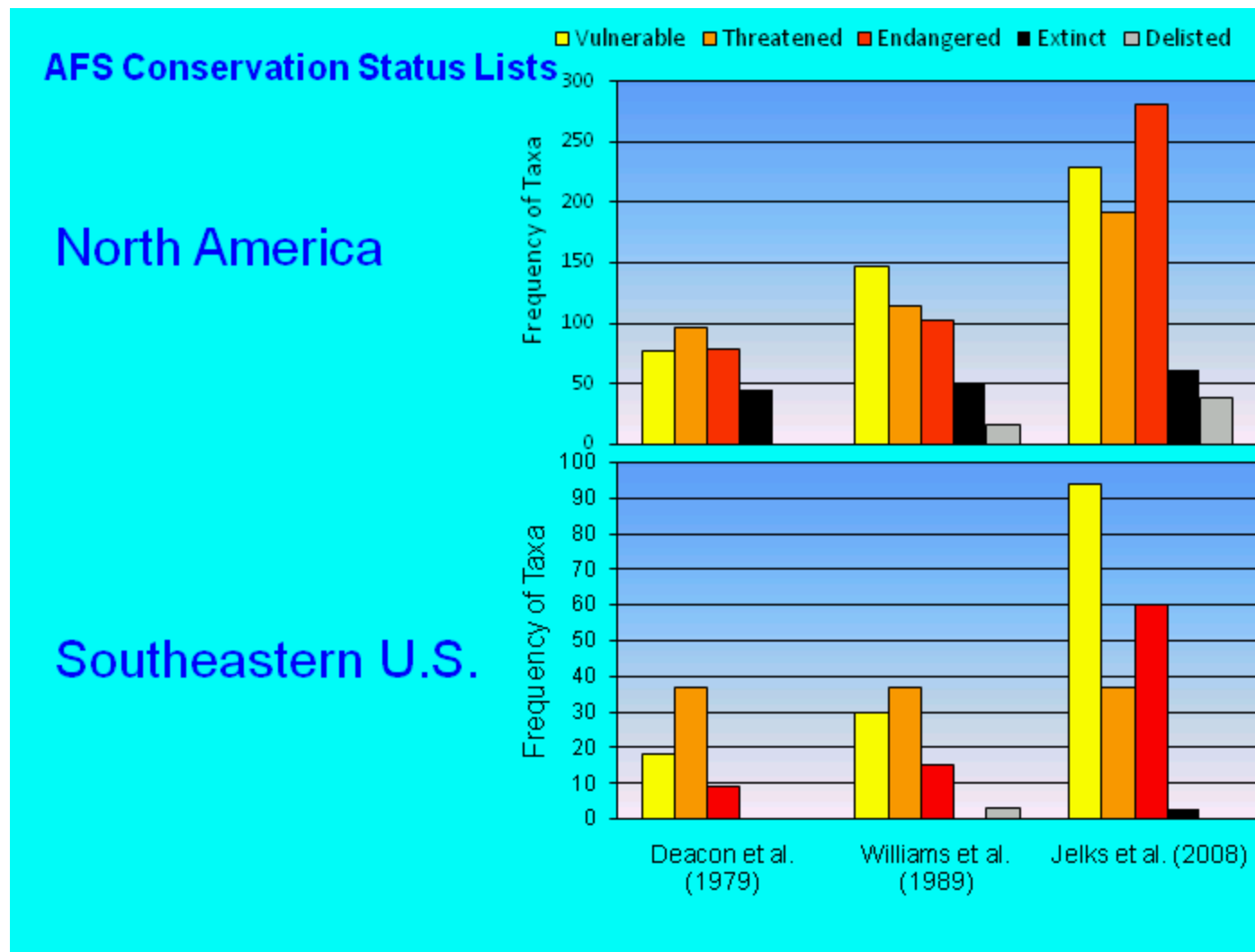


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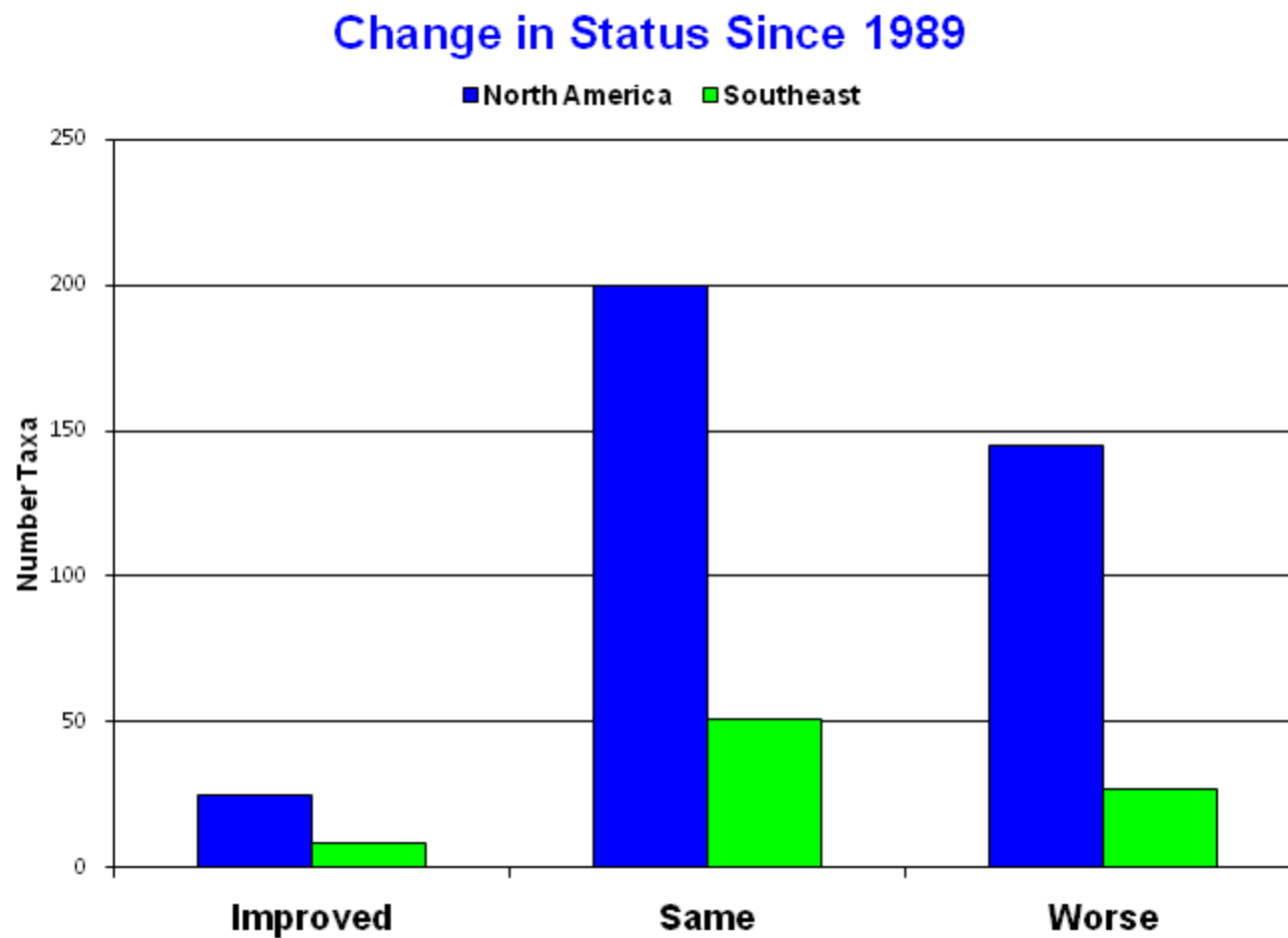
North American Imperiled Taxa by Ecoregion



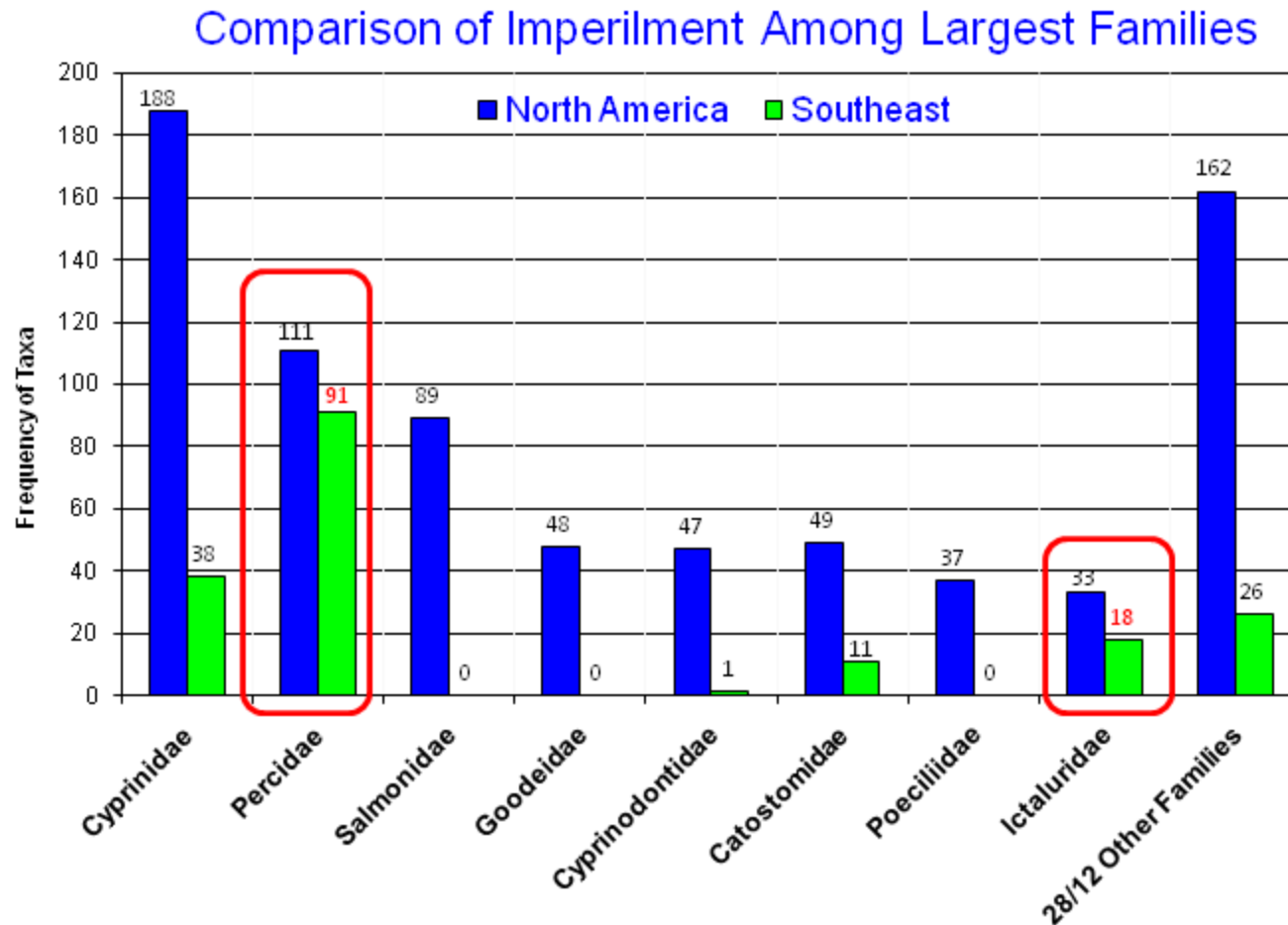
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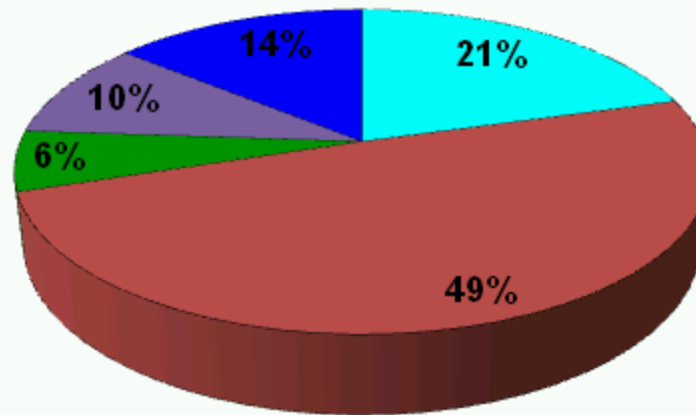
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Largest Imperiled Southeastern Fish Families

Cyprinidae Percidae Catostomidae
Ictaluridae Other Families



>70% of imperiled fishes spawn benthically

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Recovery of Fishes in the Southeast:

- Problems are complex; primarily driven by human population growth and a lack of conservation planning in development.
- Recovery actions lack sufficient funding and duration.
- Recovery actions generally lack coordination across the region; efforts have been eclectic.
- Recovery of fishes (and other aquatic biota) are often a lower priority than recovery of birds and mammals.

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Major Impediments to Recovery Actions

- Fauna is “imperfectly” known: only ca one-third of the fauna have complete life history studies.
- The fauna is more complex and diverse than previously understood.
- No systematic monitoring of fauna.
- Quantitative abundance data is lacking for the vast majority of imperiled taxa.
- *Most imperiled SE fishes live on private lands.*

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Existing Recovery Tools and Approaches

- Artificial Propagation
- Habitat Recovery
- Ecosystem Recovery

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Artificial Propagation

1. May require development of new methods.
2. Only appropriate when suitable habitat within species' historical range is available. Note: Experimental pops.
3. Genetic analysis of existing populations to determine if distinct population segments exist should be done *apriori*.
4. Requires adherence to strict protocols to ensure proportional representation of allele frequencies in progeny.
5. Usually requires a sustained effort to be successful; however, usually least expensive of all options.

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Artificial Propagation Examples

Good:

Four listed fishes: spotfin chub, *smoky madtom*, *yellowfin madtom*, and *duskytail darter* were *successfully reintroduced into Abrams Creek, Little Tennessee River system in GSMNP (and elsewhere).*

Not So Good:

Upon rediscovery of the robust redhorse, a large sucker known from the Peedee, Savannah, and Altamaha rivers in the Carolinas and Georgia, fish propagated from the Altamaha population were repeatedly stocked in the upper Savannah. Subsequent genetic studies revealed river population were genetically distinct metapopulations.

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Habitat Recovery

1. Requires participation of landowner.
2. Fixes can range from simple to complex.
3. Complex habitat restoration requires understanding of hydrological dynamics involved to ensure “fix” will achieve intended results.
4. Benefits can be limited to the restored reach.
5. Cost vary greatly depending on “fix” and reach size; results usually long lasting.
6. Strategically, it best to select streams where the headwaters are protected for extensive restoration projects.

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Example of Habitat Restoration

Okaloosa darter lives in six direct tributaries of lower Choctawhatchee River Bay on the Florida panhandle; over 90% of the darters' range is on Eglin Air Force Base.

The Environmental Branch of Eglin AFB spent over \$2,000,000 to correct erosion problems that were causing excessive sedimentation of Okaloosa darter streams, causing significant restoration of two of the six inhabited streams.

Spawning Okaloosa darters



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Ecosystem Recovery

1. Best hope for long term solutions.
2. Extremely complex socially and politically: requires broad participation of government and private sectors.
3. Long planning and implementation stages; requires sustained commitment by participants.
4. Potentially expensive but has best prospects for significant long term benefits.

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Remarkable Example of Ecosystem Recovery

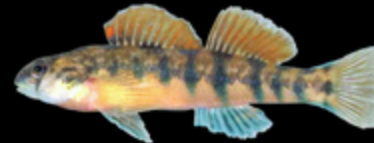
Etowah River Habitat Conservation Plan (HCP)

The Etowah River, Mobile River drainage, is a hotspot of stream fish diversity and endemism:

- ~76 extant fish species, 4 locally endemic
- ~51 extirpated mussel species
- 3 federally listed & 6 additional imperiled fishes

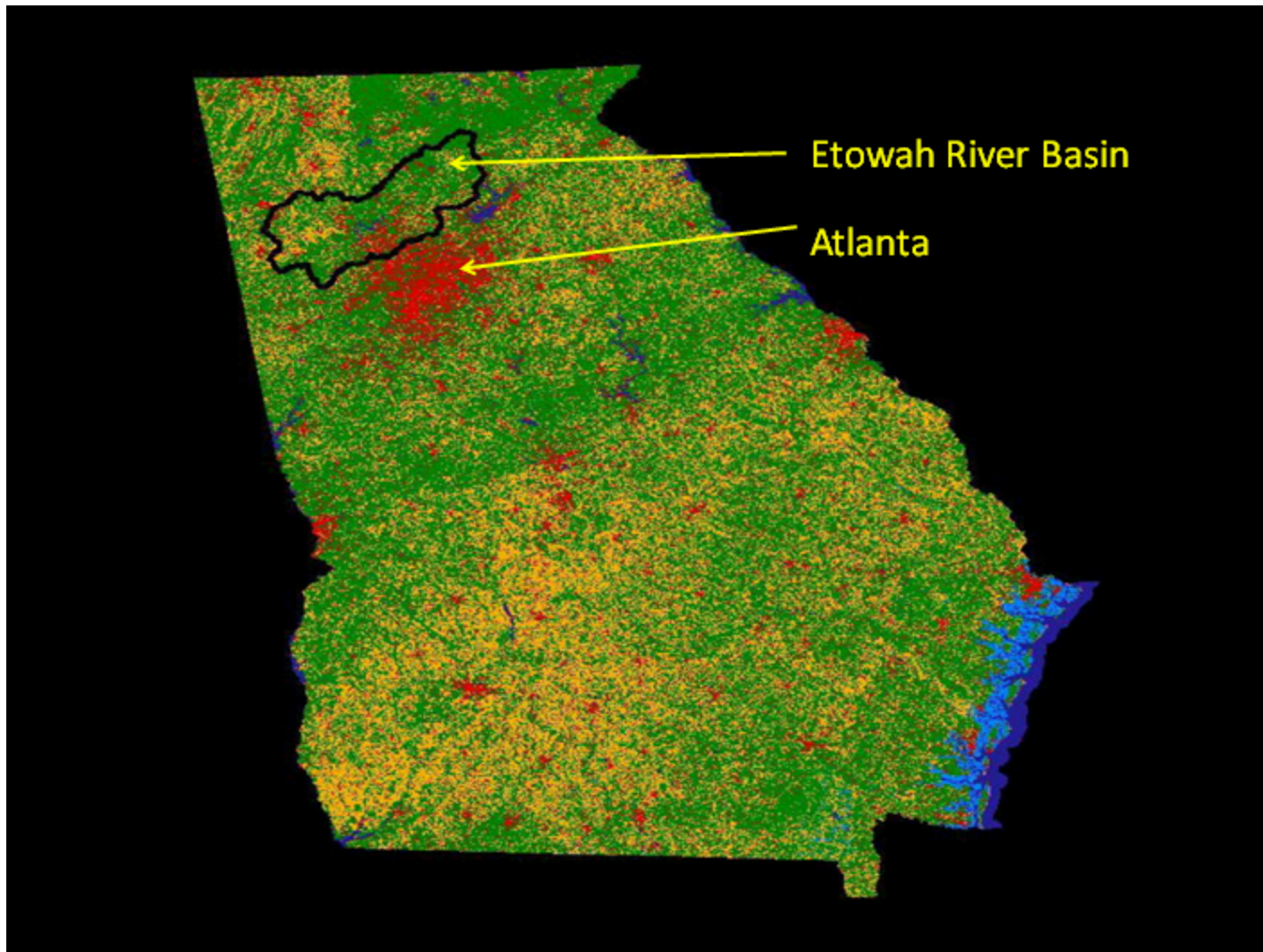


Etowah Darter, Endangered



Cherokee darter, Threatened

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Etowah HCP Partners

- USFWS
- EPA
- GA DNR
- Cherokee, Etowah, Cobb-Marietta Water and Sewer Authority
- GA Conservancy
- The Nature Conservancy
- Upper Etowah River Alliance
- UGA, Kennesaw State, Reinhardt College, Berry College
- 21 municipalities & 9 counties in the Etowah basin
- County Homebuilder Associations
- Local stakeholder organizations

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Critical Lynchpin for the HCP

A UGA Environmental Law Professor, *Laurie Fowler*, worked with county commissioners and zoning boards in the basin to develop a common dialog on conservation issues. She discovered that counties were concerned about:

- Biodiversity loss in the basin!
- Effects of urban sprawl, but at same time needed new capital.
- Laurie Fowler facilitated a dialog between county representatives, U.S. Fish and Wildlife Service, university ecologists, urban planners, & architects.

Out of these meetings and workshops, a vision for future development in the Etowah basin was developed.

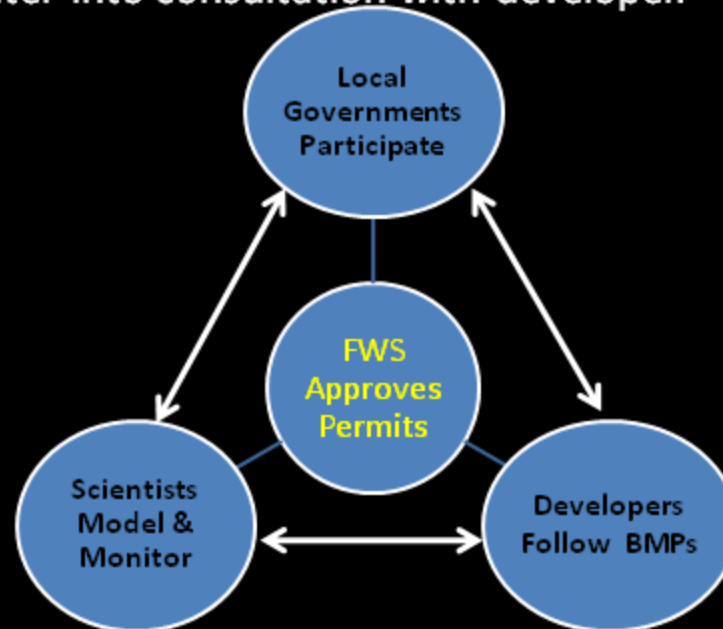
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Etowah Regional HCP

Carrot and Stick Approach:

If Developers follow BMPs, the FWS determines “no take” & permits are issued

If Developers do not follow BMPs, FWS would likely issue a jeopardy opinion and enter into consultation with developer.



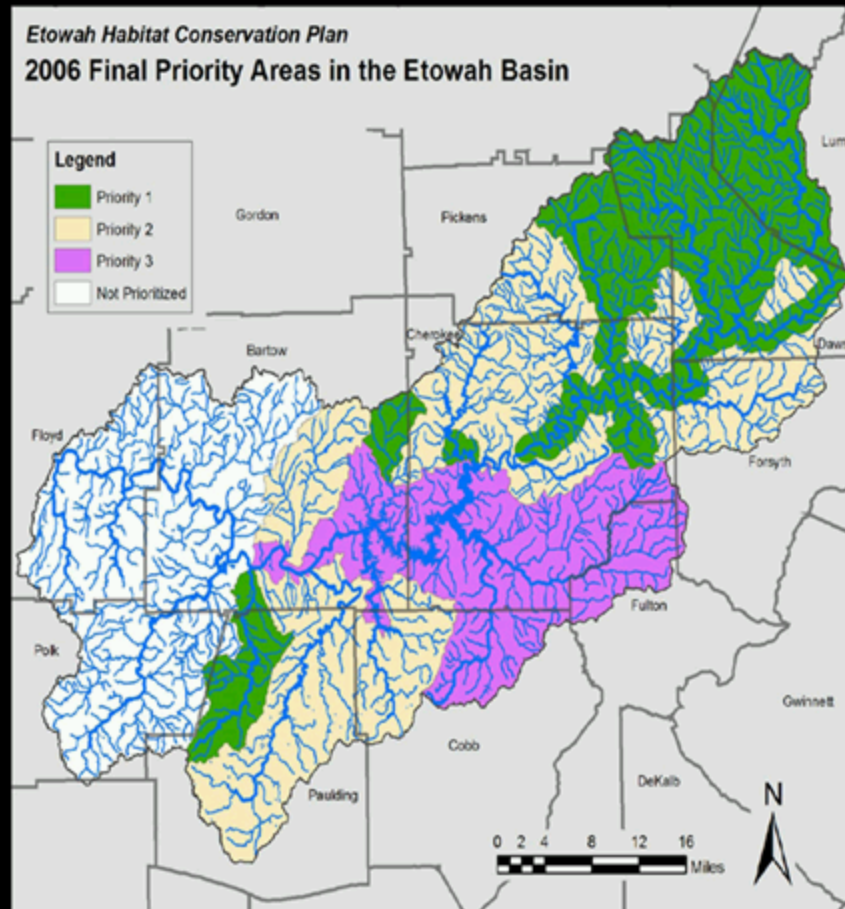
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Ecologists Developed a Model Predicting Species Persistence in Occupancy of Patches

The most sensitive variable was % infiltration rate loss

BMPs were developed to maintain infiltration, based on local geology and physiography

Priority 1: most strict
Priority 2: moderate
Priority 3: least



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Benefits to Development Community

- Protects developers & landowners from penalties
- Makes the rules clear & consistent across basin
- Saves time
 - Section 7 consultation (404 permit)
- Saves money
 - Don't have to write your own plan; hire consultants
- Increases design freedom
 - Flexible design guidelines strongly encouraged
- Local control
- Protects the fish!

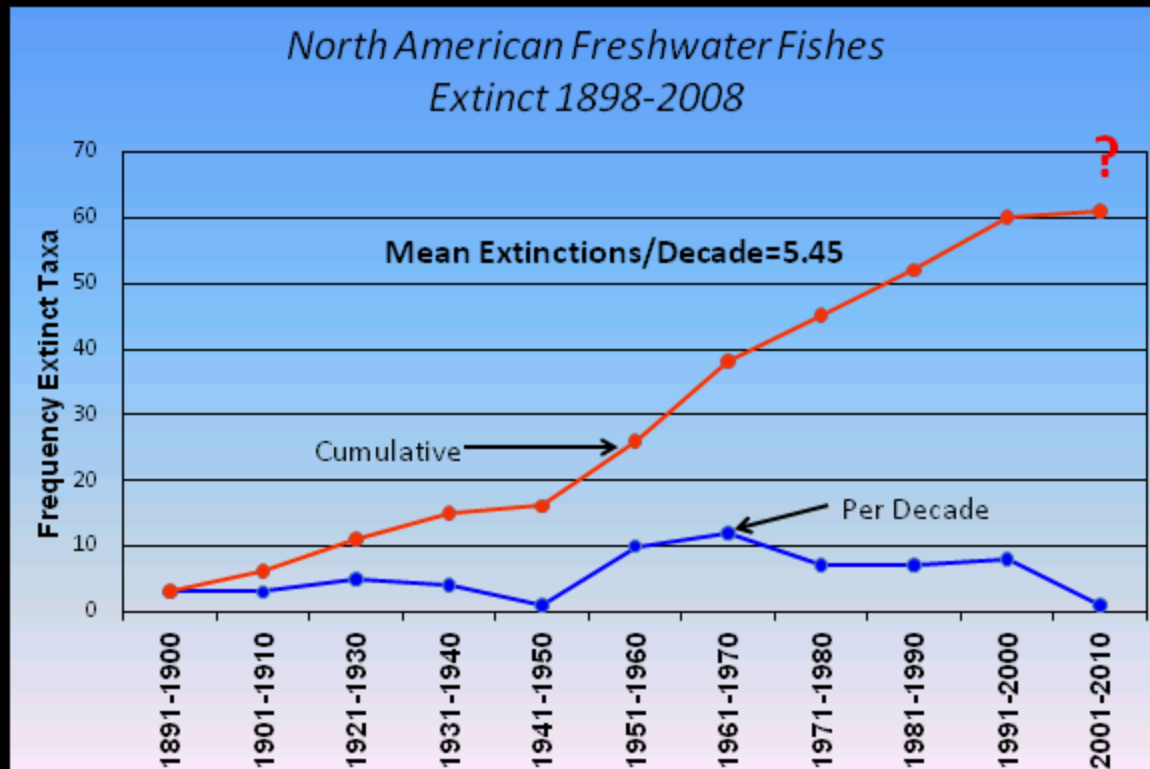
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Summary

- Nearly 40% of FW fishes are imperiled
- Of the 8 imperiled SE fishes that improved in status, only one resulted from recovery actions: Okaloosa darter, E to T
- In contrast, 14% of imperiled fishes on the AFS list declined in status since 1989
- Artificial propagation and habitat recovery have contributed to improvement and recovery of a limited number of species, and may be best approach for isolated imperiled fishes.
- The Etowah HCP appears to be the best model and hope for maintaining *persistence* of imperiled taxa in biodiversity hotspots.
- Persistence may be the realistic trade-off for “recovery”

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***Without Meaningful Action, Extinction of SE Fishes
is likely to Significantly Increase in Next Two
Decades***



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